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The QEg: A Generalized Version of QEPro Ability Measure of Emotional Intelligence

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Abstract

This article describes the development and validation of QEg, a generalized version of an existing performance-based measure of emotional intelligence (QEPro). While QEPro was designed for a population of French managers and leaders, QEg was designed for the French general population of adults. QEg is an extended version of QEPro from which existing items were extracted and revalidated and other items created in the context of the general population and everyday life. QEg is based on QEPro's three-dimensional EI model and scoring approach. Our study showed that QEg has good psychometric qualities such as high measurement precision, an appropriate level of difficulty and a clear factorial structure that is similar to QEPro.

Keywords

Emotional Intelligence, Psychometrics, Performance Test, Ability-Based EI Measure

1. Introduction

Emotional Intelligence (EI) is now widely accepted as a broad intelligence within the field of intelligence (Bryan & Mayer, 2021; MacCann et al., 2014; Mayer, 2018). Two approaches have emerged, namely “ability” and “trait” EI. The first one is conceptualized as a set of abilities analogous to general intelligence (Mayer & Salovey, 1997) and is measured through a test of maximal performance, while the second is conceptualized as a “trait” among other personality traits (Bar-On, 1997; Goleman, 1995; Petrides & Furnham, 2000, 2003) and is measured through a self-report questionnaire (trait EI).

“Trait” EI self-report measures face key limitations such as social desirability

(Matthews, Zeidner, & Roberts, 2004) and participant's difficulty in having sufficient objective perspective on themselves (Kruger & Dunning, 1999). According to Schlegel and Mortillaro (2019: p. 560), "trait EI" measures "violate the first law of intelligence" because of their significant correlations with personality measures (Matthews, Zeidner, & Roberts, 2004: p. 225) and their lack of correlation with cognitive intelligence (Furnham & Petrides, 2003).

"Ability" EI performance tests, especially the first ones (chronologically speaking), also face limitations (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023) as the consensus and expert criterion scoring methods they use have notable limitations in particular on how to identify and score the correct answer (MacCann et al., 2004).

New ability EI tests were recently elaborated, proposing a theory-based item development and scoring approach more in line with standards of intelligence (Matthews, Zeidner, & Roberts, 2004; Haag, Bellinghausen, & Jilinskaya-Pandey, 2023). Among them, the QEPro is an online-only performance test that has good psychometric qualities (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023).

This questionnaire was elaborated within the Situational Judgment Tests (SJTs) framework (Lievens, Peeters, & Schollaert, 2008) and was specifically designed for managers. Its authors invited researchers "to develop context-parallel versions that would be based on the same EI model and scoring method..." (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4095). We follow their invitation by adapting the QEPro model to a "general population" defined as a large group of participants in a study without specific characteristics (Asiamah, Mensah, & Oteng-Abayie, 2017).

Beyond the field of management, emotional intelligence concerns everybody as this form of intelligence is assumed to positively contribute to different positive life outcomes (Brackett, Rivers, & Salovey, 2011; Lopes et al., 2005; Petrides et al., 2016).

Therefore, the aim of this article is to propose and validate QEg, a generalized version of QEPro.

2. QEPro's Three-Dimensional Model of EI

According to QEPro's model (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023), EI consists of three branches (meta-competencies) named IE, UE, and SME.

Identifying Emotions (IE): IE meta-competency refers to the ability of a person to accurately identify emotions in self and in others. It consists of three abilities:

- 1) *Scanning Physiological Manifestations:* "The ability to identify her/his own emotions according to an introspective analysis of the physical sensations experienced" (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4084).
- 2) *Interpreting Emotional Cues:* The ability to identify emotions "through their cognitive manifestations; behavioral action tendencies; vocal, postural and facial cues; and the associated subjective-experiential component" (Haag, Bellinghau-

sen, & Jilinskaya-Pandey, 2023: p. 4084).

3) *Identifying Emotional Triggers*: The ability “to identify the specific triggers of their own emotional state and that of others” (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4084).

Understanding Emotions (UE): UE meta-competency refers to the ability to accurately understand emotions and anticipate their positive and negative consequences. It consists of two abilities:

4) *Understanding Emotional Timelines*: The ability “to assess the intensity of her/his emotional state (and that of others) and to anticipate its evolution over time” (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4084).

5) *Anticipating Emotional Outcomes*: The ability “to anticipate the positive and negative consequences of an emotion” (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4084).

Strategic Management of Emotions (SME): SME meta-competency refers to the ability to first select and then feel/express the appropriate emotions to adapt to a situation. It consists of two abilities:

6) *Selecting the Target Emotional State*: “The ability to identify and select the appropriate emotional state in a given situation” (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4085).

7) *Emotion Regulation*: “The ability to implement the accurate emotion regulation strategy to reach the target emotional state” (Haag, Bellinghausen, & Jilinskaya-Pandey, 2023: p. 4085).

From this model of EI, we develop the QEg, a generalized version of QEPro.

3. Methods

3.1. Sample

All participants voluntarily participated in the study without financial incentives and being aware of the confidentiality of their answers. All participants were French, living in France, and were recruited with the support of *Sciences et Avenir* (a monthly French popular science magazine) and *Le Magazine de la Santé* (a French television program devoted to medicine and science and broadcast daily and live) which have published on their respective websites a call to participate in our study.

Participants completed QEg (seven subscales) along with other questionnaires online via the Qualtrics software package. We excluded incomplete responses from our sample ($n = 15,692$) and check (through “Response ID”) that individuals only submit once their answers to ensure the quality of the collected data. The test administration extended over a period of four weeks and all participants took the tests in the same order.

The final sample of valid and complete responses ($N = 8690$ French people) was divided into three aleatory subsamples to perform three analyses (respectively: Item Response Theory (IRT), Confirmatory Factor Analysis (CFA), and correlation analyses).

These samples were similar regarding sociodemographic characteristics (**Table 1**): gender ($\chi^2(2) = 2.64, p = .26$) and age ($F(2, 8688) = .65, p = .43$). In the same way, the scores on all QEG dimensions were not statistically different between groups: *Interpreting Emotional Cues* ($F(2, 8688) = .13, p = .72$), *Scanning Physiological Manifestations* ($F(2, 8688) = 1.34, p = .25$), *Identifying Emotional Triggers* ($F(2, 8688) = 1.40, p = .24$), *Understanding Emotional Timelines* ($F(2, 8688) = .59, p = .44$), *Anticipating Emotional Outcomes* ($F(2, 8688) = .12, p = .73$), *Selecting the Target Emotional State* ($F(2, 8688) = .13, p = .72$), and *Emotion Regulation* ($F(2, 8688) = .57, p = .45$).

Table 1. Participants' sociodemographic characteristics.

	Sample 1	Sample 2	Sample 3
<i>n</i>	2876	2937	2877
Age (years)	33.14	33.89	33.98
Gender			
Male	916	971	959
Female	1960	1966	1918
Height (cm)	165.56	166.43	166.27
Weight (kg)	68.65	68.71	69.94

3.2. QEG Items

QEPro's items served as a database for QEG item development. Following Dickes et al.'s (1994) recommendations on test construction, we developed a large initial pool of items for QEG test development (**Table 2**).

Table 2. Comparison between QEPro items and QEG items.

	QEPro items	QEG initial item pool	QEPro-QEG items in common	QEG final version
Identifying Emotions (IE)				
Interpreting Emotional Cues	5	9	3	4
Scanning Physiological Manifestations	4	8	3	4
Identifying Emotional Triggers	5	7	3	4
Understanding Emotions (UE)				
Understanding Emotional Timelines	6	6	6	6
Anticipating Emotional Outcomes	5	10	2	4
Strategic Management of Emotions (SME)				
Selecting the Target Emotional State	5	9	0	5
Emotion Regulation	5	8	0	4
Total	35	57	17	31

Concerning IE and UE dimensions, the items are all emotion-centered and therefore do not require specific contextual adaptation for QEG development. According to test development guidelines (Dickes et al., 1994), we thus generated a pool of supplementary items raising the initial item pool from 25 to 40 items to identify the most suitable items for the general population.

Concerning SME, both subscales of this dimension are contextual. Situational Judgment Framework guided the conception of the QEPro items for these scales. As QEPro were specially conceived for a management context, the items for QEG needed to be recontextualized to everyday life. Thus, SJTs conducted us to explore emotional situations of everyday life that allows us to construct 17 new vignettes that are likely to occur in everyday life.

3.3. Measures

All the measures (listed below) used for this study have satisfactory psychometric properties (Table 3) as they meet Nunnally and Bernstein's (1994) psychometric standards. All of them were French adaptations of well-established self-report questionnaires.

We used as a Personality measure the Big Five Inventory (BFI; Plaisant et al., 2010).

We used as Affective measures the Toronto Alexithymia Scale (TAS-20; Loas et al., 1996), the Perceived Stress Scale 10 (PSS-10; Bellinghausen et al., 2009) and the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001; Jermann et al., 2006).

We further used as Quality of life measures the Shirom-Melamed Burnout Measure (SMBM; Sassi & Neveu, 2010), the Satisfaction with Life Scale (SWLS; Bacro et al., 2020), the Gratitude Questionnaire-6 (GQ-6; Shankland & Martin-Krumm, 2012) and the Survey Work-Home Interaction-Nijmegen (SWING; Lourel, Gana, & Wawrzyniak, 2005).

Finally, we used as a Decision-making measure the Consideration of Future Consequences Scale (CFC-14; Camus, Berjot, & Gruev-Vintila, 2014).

4. Results

Item Response Theory (IRT) was used to assess psychometric properties of the items and the test (Sample 1). We then ran a Confirmatory Factor Analysis (CFA) based on the selected item pool from the IRT (Sample 2). Divergent and convergent validity was appreciated through correlation analyses allowing us to explore the association between QEG and life outcomes (Sample 3).

4.1. Item Response Theory (IRT)

In line with the QEPro model, the underlying structure of QEG questionnaire is multidimensional. As for QEPro, QEG items are multiple choice items with multiple response options and one single correct answer. Therefore, we used a multidimensional 3-parameter model of IRT with the following parameters: "a" (Discriminating power), "b" (Item difficulty) and "c" (guessing parameter). In addi-

tion, item-test correlations (T-Rpbis) and item-subscale correlations (S-Rpbis) were appreciated.

We conducted an IRT analysis on Sample 1 with Xcalibre 4.2.0.1: IRT Item Parameter Estimation Software. IRT analysis allowed us to select items with satisfactory psychometric qualities.

Table 3. Means, standard deviations and Cronbach's alpha for each variables.

	Means	SD	α
Extraversion	21.25	7.2	.85
Agreeableness	33.62	6.4	.76
Conscientiousness	27.44	6.8	.83
Neuroticism	22.71	7.3	.85
Openness	36.35	6.5	.77
Alexithymia	43.84	12.4	.86
Alexithymia: Difficulty to Describe	13	4.9	.79
Alexithymia: Difficulty to Identify	18.31	6.1	.81
Alexithymia: Externally-Oriented Thinking	12.53	4.2	.57
Emotional Regulation: Acceptance	13.54	3.5	.82
Emotional Regulation: Rumination	13.03	3.7	.70
Emotional Regulation: Blaming Others	7.70	2.9	.76
Emotional Regulation: Self-Blame	10.99	3.8	.84
Emotional Regulation: Positive Reappraisal	13.64	4.0	.82
Emotional Regulation: Putting into Perspective	13.43	3.8	.83
Emotional Regulation: Refocus on Planning	13.93	3.7	.79
Emotional Regulation: Positive Refocusing	9.82	3.9	.71
Perceived Stress	25.3	7.4	.87
Burnout: Physical Fatigue	24.46	8.9	.93
Burnout: Emotional Exhaustion	8.99	4.1	.83
Burnout: Cognitive Weariness	16.84	7.2	.92
Satisfaction with Life	14.58	4.9	.89
Gratitude	19.85	4.5	.74
Work-Home Negative Interaction	10.55	6.4	.88
Home-Work Negative Interaction	3.34	3.2	.82
Home-Work Positive Interaction	8.08	4.4	.81
Work-Home Positive Interaction	8.83	4.3	.80
Immediate Consequences	18.22	6.1	.81
Future Consequences	25.39	5.2	.75

From the initial 65 item pool, 31 items met the following IRT criteria (Abida et al., 2011). For all selected items, the “a” parameter (Discriminating power of the item) is set above .25, the “b” parameter (Item difficulty parameter) varies from 2.6 to -2.6 and the “c” parameter (the guessing parameter) varies from .16 to .33.

Note that we choose to keep four items that are above Laatsch and Choca’s (1991) criterion for item difficulty as these items allowed us to introduce gratitude which has a positive impact on key life outcomes (Diniz et al., 2023) and does not appear in QEPro.

All selected items showed positive correlations both on the item-subscale level and the item-test level.

4.2. Confirmatory Factor Analysis (CFA)

QEg was adapted from QEPro. In order to validate the underlying factor structure of QEg, we performed a Confirmatory Factor Analysis (CFA) on Sample 2. To take account of the nature of the data (multiple choice items with one single correct answer), diagonally weighted least squares with a polychoric correlation matrix were used.

Several goodness-of-fit measures were used to determine the acceptability of the models. The analyses used the robust maximum likelihood estimator, which takes account of non-normal data distribution. This analysis was performed using the Lavaan package (Rosseel, 2012). The Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were used. Values close to or $>.95$ for CFI and TLI, $<.08$ for SRMR (Hu & Bentler, 1999) and $<.08$ for RMSEA (Steiger, 2007) are acceptable.

The 31 items were then used to validate the factor model observed for QEPro. For QEg data, a Confirmatory Factor Analysis (CFA) was performed. This analysis used the Lavaan package (Rosseel, 2012).

All the estimated factor loadings found in the CFA were significant at $p < .001$ (Figure 1). Our results show a good fit compared with the expected values: $\chi^2(424) = 757.85$, CFI (Comparative Fit Index) = .94, TLI (Tucker-Lewis Index) = .93, RMSEA (Root Mean Square Error of Approximation) = .016 [.014 - .016], SRMR (Standardized Root Mean Square Residual) = .022.

As expected, the 31 items load on one of the seven factors only (Figure 1). These factors are loaded in three dimensions (IE, UE and SME). CFA confirms the factor structure of QEg, in line with the observed QEPro’s factor structure (Haag et al., 2023). All indicators are in line with expected standards.

4.3. Convergent and Divergent Validity: EI and Other Variables

In this final step, we investigated the relations between QEg (GEI—Global score; IE, UE, and SME scores), personality measure, affective measures, quality of life and performance outcomes. These analyses were conducted on Sample 3.

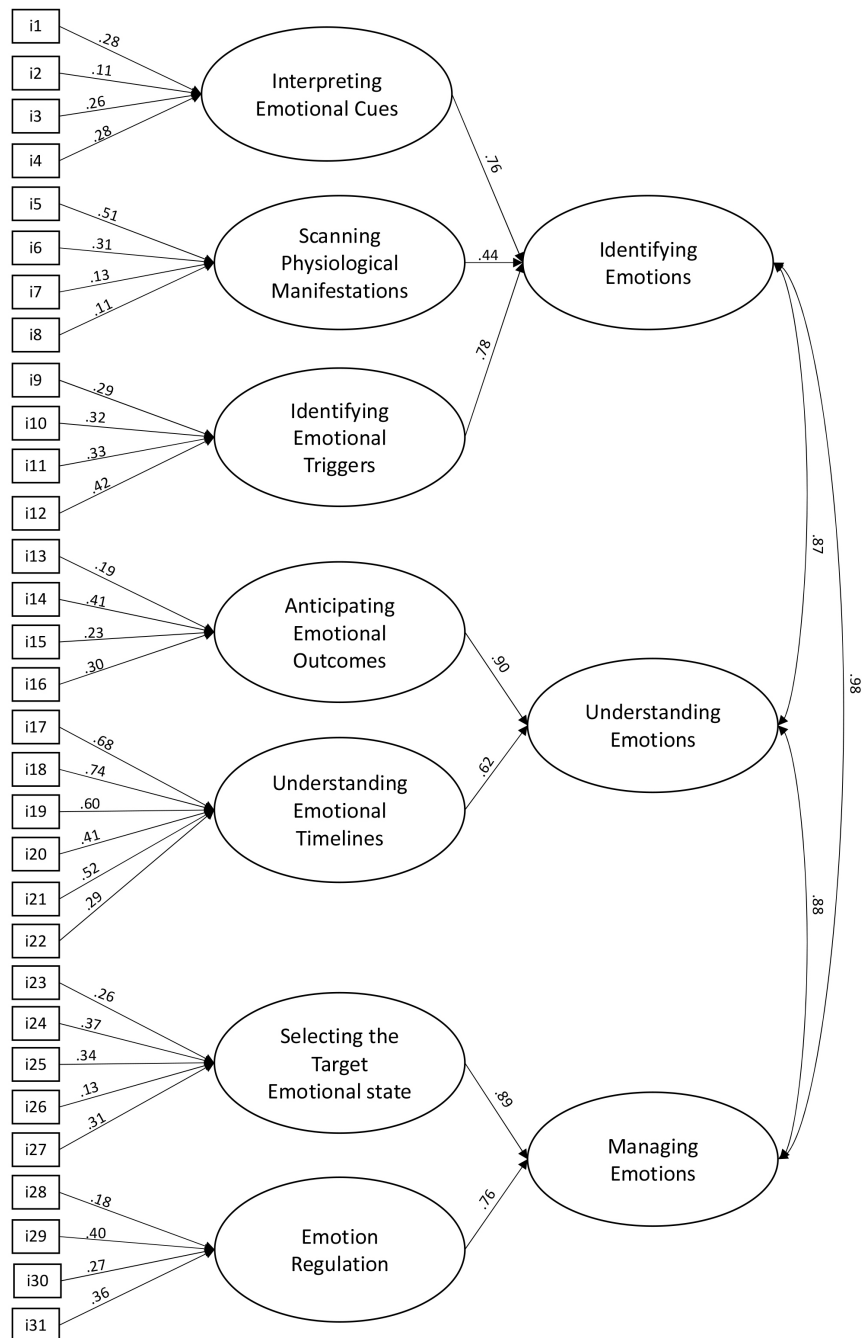


Figure 1. Confirmatory model for the QEG with seven first-order factors and three correlated second-order dimensions.

QEG correlates in theoretically congruent and meaningful ways with all variables (Table 4) (Brackett, Rivers, & Salovey, 2011; Haag, Bellinghausen, & Jilinskaya-Pandey, 2023; Lopes et al., 2005; Petrides et al., 2016; Schlegel & Mortillaro, 2019).

As expected, we found significant negative correlations between QEG and the perceived level of stress—that has an impact on health (e.g. Ng & Jeffery, 2003)—which is consistent with the literature (Shahin, 2020). QEG is also nega-

tively related to home-work negative interaction—which is associated with fatigue (Allen et al., 2000) and decreased psychological health (Demerouti, Bakker, & Bulters, 2004). Emotional exhaustion, considered as the core meaning of Burnout (Lee & Ashforth, 1996)—which is correlated with depressive symptoms (Gerber et al., 2018) and cholesterol and triglycerides levels (Shirom et al., 1997)—is also negatively related to QEG.

Table 4. Correlations between QEG and other variables.

	GEI	IE	UE	SME
Extraversion	-.04	-.03	-.05	-.01
Agreeableness	.10***	.05	.05	.12***
Conscientiousness	-.03	-.01	-.07	.02
Neuroticism	.02	.02	.02	.00
Openness	.15***	.04	.13***	.16***
Alexithymia	-.22***	-.10***	-.17***	-.21***
Alexithymia: Difficulty to Describe	-.17***	-.09	-.12***	-.17***
Alexithymia: Difficulty to Identify	-.18***	-.10***	-.14***	-.15***
Alexithymia: Externally-Oriented Thinking	-.23***	-.09***	-.17***	-.24***
Emotional Regulation: Acceptance	.11***	.06	.08**	.11***
Emotional Regulation: Rumination	.08***	.03	.05	.09***
Emotional Regulation: Blaming Others	-.06**	-.03	-.03	-.07**
Emotional Regulation: Self-Blame	.12***	.07*	.09***	.10***
Emotional Regulation: Positive Reappraisal	.06**	.00	.03	.10***
Emotional Regulation: Putting into Perspective	.02	-.02	.01	.05
Emotional Regulation: Refocus on Planning	.12***	.04	.09***	.14***
Emotional Regulation: Positive Refocusing	-.09***	-.07	-.10***	-.03
Perceived Stress	-.08***	-.03	-.07*	-.06
Burnout: Physical Fatigue	.01	.02	.00	-.03
Burnout: Emotional Exhaustion	-.09***	-.06	-.04	-.11***
Burnout: Cognitive Weariness	-.04	-.06	-.04	-.11
Satisfaction with Life	.10***	.05	.08*	.08***
Gratitude	.18***	.10***	.13***	.16***
Work-Home Negative Interaction	.02	.00	.02	.02
Home-Work Negative Interaction	-.08***	-.05	-.05	-.07**
Home-Work Positive Interaction	-.05	-.04	-.06	-.01
Work-Home Positive Interaction	-.01	-.01	-.03	.03
Immediate Consequences	-.16***	-.06	-.13***	-.17***
Future Consequences	.12***	.04	.10***	.13***

Notes: *** $p < .001$, ** $p < .01$, * $p < .05$.

We found also significant positive correlations between QEg and the disposition towards experiencing and expressing gratitude—which helps individuals to deal with adversity, anxiety, and depression, build strong interpersonal relationships, experience fewer toxic emotions, and is strongly and consistently associated with greater well-being, higher satisfaction with life, better emotional experiences, better physical and mental health (e.g. [Diniz et al., 2023](#)). Perceived satisfaction with life—which is associated with better health, lower risk of mortality, higher self-esteem, stronger resilience, flourishing, lower depression and anxiety (e.g. [Cerezo et al., 2022](#))—is also positively correlated to QEg.

A positive correlation was also observed between QEg and the ability to consider future consequences, to delay gratification of immediate needs and a tendency to make decisions that are more future-oriented. Research revealed that individuals who do not consider the future consequences of their actions are more vulnerable to risky behaviors that negatively impact their health (e.g. [Murphy & Dockray, 2018](#)).

Finally, we observe that QEg correlates positively with different regulation strategies including “Rumination” strategy that is often considered as maladaptive ([Nolen-Hoeksema, 2000](#)) even though it is not always the case ([Ciarocco, Vohs, & Baumeister, 2010](#); [Derlega et al., 1993](#)). Indeed, repetitive emotions and thoughts can sometimes help (when limited in time) understand the self and the potential outcomes of emotionally charged situations ([Brosschot, 2010](#)). Note also that CERQ “Rumination” items are formulated in a self-reflective way.

5. Discussion

This article aims at adapting QEPro questionnaire to a general population of adults. In order to appreciate psychometric properties of the items, an IRT analysis was conducted. 31 items were selected based on their high psychometric properties. Then, CFA analysis was conducted and confirmed a three-dimensional factor structure underlying QEg.

Furthermore, convergent and divergent validity were investigated and showed that QEg was related to affective measures such as perceived stress and burn-out, quality of life measures such as satisfaction with life and work-home interaction. Emotional intelligence as measured by QEg is also related to performance outcomes such as decision making.

5.1. Limitations

Even if collecting data through a popular science magazine and a health-themed TV show ensured obtaining a large number of participants, it could have introduced a sample bias, favoring individuals with pre-existing interests in science or health.

QEg is adapted from QEPro, a tool originally designed for French managers and leaders, to the French general population. Diverse backgrounds within the French general population potentially limit the generalizability and applicability of the QEg across different subpopulations.

QEG also needs further validity investigations by: 1) exploring QEG's predictive validity, 2) adapting and validating the QEG to other cultures, and 3) assessing the effect of developmental programs based on the QEG model.

5.2. Future Research

In the near future, we will re-examine QEG data through a Latent Profile Analysis (LPA), which is specifically designed to account for the presence of subpopulations characterized by different parameters (Meyer & Morin, 2016; Morin, 2016). LPA offers a unique way to investigate how the various components of emotional intelligence will be combined among different types of persons. Thus, this will allow us to understand even more in-depth how emotionally intelligent people process emotions to maximize benefits for everyday life.

Research in emotional intelligence (Joseph & Newman, 2010) suggests that Identifying Emotions (IE) must causally precede Understanding Emotions (UE), which in turn precedes Strategic Management of Emotions (SME). Future research should investigate if the QEG model is a cascading model. This could have significant implications in terms of EI training programs based on the QEG model.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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